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Article

Biochemical Profile and Antioxidant Activity of Dried Fruit Produced from Apricot Cultivars Grown in Latvia

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Abstract: The present study focused on evaluating the biochemical profiles of four apricot cultivars (cv.) (*Prunus armeniaca* L.) grown in Latvia and demonstrating their processing to obtain the food product, dried candied fruit (DCF). The fingerprinting of apricot fruit approached by LC-MS and ultraviolet–visible spectroscopy revealed the abundance of bioactives responsible for the antioxidant activity. The outstanding composition of group compounds, i.e., phenolics, flavonoids, and vitamin C, was observed in the cv. 'Dimaija', followed by cv. 'Gundega' and cv. 'Velta'. The lowest values were found in the cv. 'Boriss' and fruit from a market of Greek origin. However, the latter two contained the highest carotenoid levels due to a more pronounced maturity. Amongst the 13 individual phenolics detected, rutin, chlorogenic and neochlorogenic acids, catechin, and epicatechin prevailed. The concentrations observed were the highest in cv. 'Dimaija', followed by cv. 'Velta' and cv. 'Gundega'. Osmotic dehydration and convective drying of apricot fruit variedly influenced the content of bioactives in DCF products. The most substantial decrease due to thermal lability was observed in the vitamin C content in DCF, accounting for a 95.3% loss for all cultivars. The content of total phenolics, flavonoids, and carotenoids in DCF, on average, was 62.7%, 49.6%, and 87.6% lower than that observed in the raw fruit, respectively. On average, the content of individual phenolics in DCF, such as rutin and chlorogenic acid, decreased by 63.8% and 20.8%, respectively. The decline in the content of bioactives was conditioned by the physical migration of the cell components to the hypertonic solution. However, the increase in the content of cell wall-bound phytochemicals, such as catechin and epicatechin, after osmotic dehydration and convective drying, was observed in DCF, corresponding to a 59.5% and 255.64% increase compared with the raw fruit, respectively. Panelists generally responded positively to the developed DCF; however, greater preference was given to products with a lower phenolic content, such as cv. 'Boriss' and those produced from the market fruit. It is believed that the high flavan-3-ols content, along with chlorogenic acid, contributed to the bitter taste of DCF. Overall, apricot fruits represent the abundance of bioactives retained in DCF after osmotic dehydration and convective drying. The findings observed in the current study allow to consider DCF as a functional food; however, given the high sugar content, their consumption should be in moderation.

Keywords: convective drying; fruit processing; fruit quality; hypertonic solution; osmosis; phenolic compounds

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Table S1. Multiple reaction monitoring (MRM) transitions, collision energy, Q1, Q3 and dwell time for investigated phenolic compounds.

Compound	Retention time, min	Molecular formula	Ionization mode	MRM transitions	Q1 Pre Bias, V	Collision energy, V	Q3 Pre Bias, V	Dwell time, msec
Gallic acid	8.430	$C_7H_6O_5$	$[M-H]^-$	169.0000→124.9000 169.0000→78.9500	12.0 12.0	17.0 24.0	10.0 15.0	97.0 97.0
Neochlorogenic acid	9.736	$C_{16}H_{18}O_9$	$[M-H]^-$	353.1000→191.0500 353.1000→135.0000	13.0 13.0	22.0 31.0	20.0 12.0	63.0 63.0
Protocatechuic acid	11.074	$C_7H_6O_4$	$[M-H]^-$	153.2000→108.9500 153.2000→107.9500	10.0 10.0	16.0 24.0	20.0 22.0	21.0 21.0
Chlorogenic acid	11.828	$C_{16}H_{18}O_9$	$[M-H]^-$	353.1000→191.1000 353.1000→85.0500	19.0 13.0	22.0 43.0	20.0 16.0	18.0 18.0
(+)-Catechin	12.180	$C_{15}H_{14}O_6$	$[M-H]^-$	288.9500→245.0000 288.9500→109.0000	14.0 14.0	15.0 26.0	14.0 19.0	14.0 14.0
(−)-Epicatechin	12.654	$C_{15}H_{14}O_6$	$[M-H]^-$	289.0500→245.0000 289.0500→109.0000	14.0 14.0	16.0 26.0	14.0 20.0	14.0 14.0
Vanillin	12.974	$C_8H_8O_3$	$[M+H]^+$	152.9500→65.1000 152.9500→93.0500	-10.0 -10.0	-24.0 -16.0	-24.0 -20.0	14.0 14.0
Caffeic Acid	13.442	$C_9H_8O_4$	$[M-H]^-$	179.1500→135.0000 179.1500→134.0000	12.0 12.0	18.0 25.0	25.0 24.0	23.0 23.0
Rutin	14.470	$C_{27}H_{30}O_{16}$	$[M-H]^-$	609.1000→300.0000 609.1000→301.0500	20.0 21.0	28.0 36.0	17.0 17.0	23.0 23.0
para-Coumaric acid	14.579	$C_9H_8O_3$	$[M-H]^-$	163.0500→119.0500 163.0500→93.0500	11.0 12.0	16.0 31.0	21.0 17.0	23.0 23.0
Luteolin-7-*O*-glucoside	14.717	$C_{21}H_{20}O_{11}$	$[M-H]^-$	447.0500→285.0500 447.0500→284.0000	20.0 21.0	28.0 36.0	17.0 17.0	23.0 23.0
Vanillic acid	15.187	$C_8H_8O_4$	$[M-H]^-$	167.1500→151.9500 167.1500→107.8000	18.0 11.0	17.0 17.0	27.0 17.0	23.0 23.0
Sinapic acid	17.448	$C_{11}H_{12}O_5$	$[M-H]^-$	223.3000→208.0000 223.3000→192.9500	17.0 10.0	14.0 22.0	12.0 19.0	23.0 23.0
trans-Ferulic Acid	19.884	$C_{10}H_{10}O_4$	$[M-H]^-$	193.0500→134.0000 193.0500→178.0500	10.0 10.0	18.0 15.0	23.0 15.0	23.0 23.0
Isorhamnetin	21.570	$C_{16}H_{12}O_7$	$[M+H]^+$	316.8500→252.8500 316.8500→302.1000	-20.0 -20.0	-14.0 -25.0	-19.0 -13.0	70.0 70.0
Kaempferol	21.831	$C_{15}H_{10}O_6$	$[M+H]^+$	286.8500→222.9500 286.8500→69.1000	-18.0 -18.0	-13.0 -45.0	-17.0 -14.0	70.0 70.0
Quercetin	20.644	$C_{15}H_{10}O_7$	$[M+H]^+$	302.8000→153.0500 302.8000→229.1000	-19.0 -14.0	-34.0 -30.0	-18.0 -18.0	46.0 46.0
Rhamnetin	22.553	$C_{16}H_{12}O_7$	$[M-H]^-$	315.0500→170.7500 315.0500→300.0500	15.0 22.0	12.0 22.0	15.0 19.0	70.0 70.0

Note: The first multiple reaction monitoring (MRM) transitions found were used for quantitative analysis, whereas the second for qualitative.

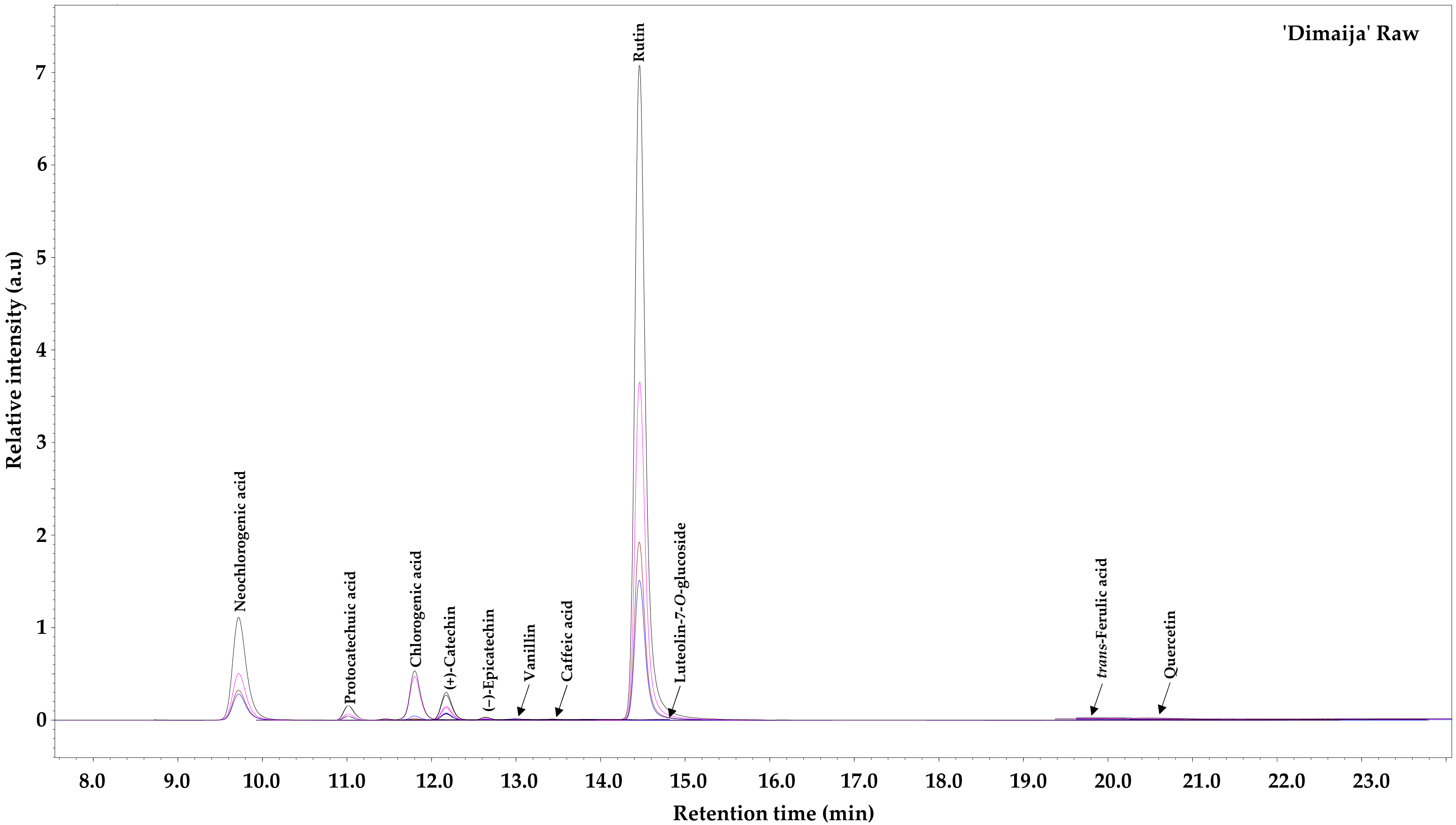

Figure S1. Extracted ion chromatogram (EIC) in multiple reaction monitoring (MRM) mode represents the profile of major phenolic compounds detected in raw apricot fruit of cultivar 'Dimaija'.

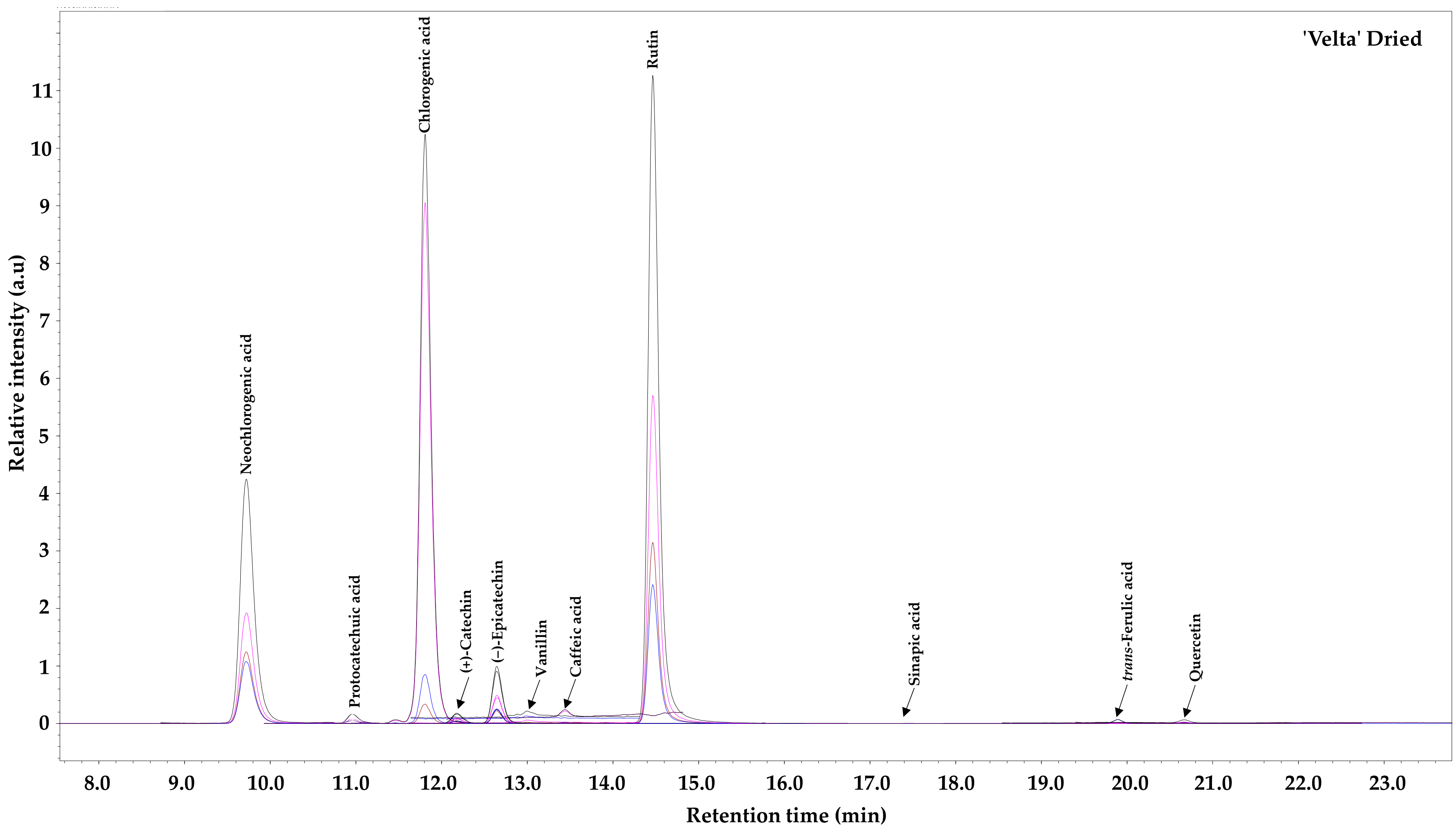

Figure S2. Extracted ion chromatogram (EIC) in multiple reaction monitoring (MRM mode represents the profile of major phenolic compounds detected in dried candied apricot product of cultivar 'Velta'.